AMENDMENT

IN THE SPECIFICATION:

Please amend paragraph 14 as follows:

Referring to Figure 1 a heat pump water heater 10 includes a vapor compression circuit 14 that transfers heat to a water circuit 22 that in turn heats water within a water tank 23. Water is circulated within the water circuit 22 by a pump 25. A refrigerant within the vapor compression circuit 14 moves between high-pressure and low-pressure portions of the circuit 14 through an expander 18. The ~~system~~circuit 14 utilizes a refrigerant that exceeds a critical pressure when discharged from a compressor 12. Preferably, the refrigerant is carbon dioxide (CO2), however, systems utilizing other refrigerant formulations will also benefit from the disclosures of this invention.

Please amend paragraph 15 as follows:

The circuit 14 includes the compressor 12, a heat exchanger 16, the expander 18 and an evaporator 20. The water circuit 22 flows through the heat exchanger 16 and is in thermal contact with the ~~refrigerants~~ circuit 14. The refrigerant absorbs heat within the evaporator 20 and increases in enthalpy. The compressor 12 increases the pressure of the refrigerant, resulting in an increase in temperature. High pressure, high temperature refrigerant rejects heat to water within the water circuit 22 within the heat exchanger 16. High pressure, low temperature refrigerant enters the expander 18 and undergoes expansion. Refrigerant emerging from the expander 18 is at a low pressure and low temperature. The expander 18 drives a friction heat generator 26 that utilizes energy expended by free expansion of refrigerant to heat water within the water circuit 22.

Please amend paragraph 16 as follows:

Referring to Figure 2, the expander 18 includes a rotor 28 driven by expanding refrigerant flowing from the high-pressure portion to the low-pressure portion of the vapor compression circuit 14. Preferably, the rotor 28 includes a plurality of radially extending vanes 30 shaped to cause rotation in response to expanding refrigerant. The size and specific shape of the rotor 28 are application dependent, and a worker skilled in the art, with the benefit of this disclosure would understand how to configure the rotor 28 to optimally reclaim expansion energy. The rotor 28 is mounted to rotate a shaft 32. The shaft 32 extends from the expander ~~26~~18 and drives a friction disk 34 within the friction heat generator 26.

Please amend paragraph 20 as follows:

The drive 40 controls the magnitude of load applied between the friction disk 34 and the plate 38. Changing the amount of load between the friction disk 34 and the plate 38 controls the generation of heat. Further, the load applied increases the resistance to rotation of the rotor 28. Varying the load placed on the ~~friction disk~~rotor 28 controls the refrigerant high-side pressure and flow rate. With an increased load, the refrigerant high-side pressure increases while its flow rate is reduced. Reducing the load on the friction disk 34 will increase refrigerant flow, while decreasing the refrigerant high-side pressure.

Please amend paragraph 22 as follows:

Referring to Figure 3, another expander 18' according to this invention is schematically illustrated and includes a piston 50 moving in a chamber 53 in response to expanding refrigerant. The chamber 53 includes an inlet 56 and an outlet 58. Flow of refrigerant within the circuit 14 is regulated by sequentially opening and closing valves to move the piston 50. Movement of the piston 50 is transmitted through connecting rod 52 and a pivotal connection 54 to the shaft 32. The rotation of shaft 32 in turn rotates the friction disk 34 within the friction heat generator 26.

Please amend paragraph 23 as follows:

Referring to Figure 4, another expander 18'' is shown schematically, and includes a bladed shaft 60. The bladed shaft 60 includes a vane 62 extending radially about the shaft 60. The vane 62 extends about an axis 64 of the shaft 60 such that expanding within the circuit refrigerant 14 forces rotation of the vane 62 and thereby the shaft 60. The shaft 60 in turn rotates the shaft 32 that extends from the friction heat generator 26. The shaft 60 may be a portion of the shaft 32 or a separate shaft connected to drive the shaft 32.